

WHAT IS CLAIMED IS:

1. A method of fabricating $\text{GaAs}_{(1-x)}\text{Sb}_x$ layers, comprising:
locating a substrate in an MOCVD chamber;
setting a temperature of the MOCVD chamber between 500 °C and 650 °C;
and
growing $\text{GaAs}_{(1-x)}\text{Sb}_x$ on the substrate using an MOCVD process in which a source of Ga, a source of Sb, and a source of As are present.

2. The method according to claim 1, wherein x has a value corresponding to a ratio of As to Sb.

3. The method according to claim 2, wherein the value of x is 0.5.

4. The method according to claim 2, wherein the value of x is less than 0.5.

5. The method according to claim 1, wherein the source of Ga is TMGa or TEGa, and the source of Sb is TMSb.

6. The method according to claim 1, wherein the source of As is AsH_3 or TBAs.

7. The method according to claim 1, further including carbon doping the $\text{GaAs}_{(1-x)}\text{Sb}_x$ using CCl_4 or CBr_4 .

8. A tunnel junction having of a p-doped $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer.

9. A tunnel junction according to claim 8, wherein the p-doped $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer is doped with carbon with a concentration greater than $1 \times 10^{19} \text{ cm}^{-3}$.

10. A tunnel junction according to claim 9, further including an n-doped layer of InP, AlInAs, AlInGaAs, or InGaAsP.

11. A tunnel junction according to claim 10, wherein the n-doped layer is doped with a concentration greater than $5 \times 10^{19} \text{ cm}^{-3}$, wherein the $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer is doped with a concentration greater than $5 \times 10^{19} \text{ cm}^{-3}$, and wherein the n-doped layer is less than about 10 nanometers thick.

12. A tunnel junction according to claim 10, wherein the n-doped layer is InP, and wherein x has a value of 0.5.

13. A vertical cavity surface emitting laser, comprising:
an active region having a plurality of quantum wells, and
a tunnel junction over said active region, wherein said tunnel junction includes
a $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer.

14. A vertical cavity surface emitting laser according to claim 13, further including an n-type bottom spacer adjacent the active region, and an n-type bottom DBR adjacent the n-type bottom spacer.

15. A vertical cavity surface emitting laser according to claim 13, further including an n-type top spacer adjacent the tunnel junction and an n-type top DBR adjacent the n-type top spacer.

16. A vertical cavity surface emitting laser according to claim 13, wherein the $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer is grown by MOCVD.

17. A vertical cavity surface emitting laser according to claim 13, wherein the $\text{GaAs}_{(1-x)}\text{Sb}_x$ layer is doped with carbon with a concentration greater than $5 \times 10^{19} \text{ cm}^{-3}$.

18. A vertical cavity surface emitting laser according to claim 13, wherein said active region includes InGaAsP or AlInGaAs.

19. A vertical cavity surface emitting laser according to claim 18, wherein said tunnel junction includes an n-type InP layer.

20. A vertical cavity surface emitting laser according to claim 13, wherein x is 0.5.